

Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
VOL. XXXIX. No. 2.

CHIRIQUI MAMMALIA.

BY OUTRAM BANGS.

CAMBRIDGE, MASS., U. S. A. :
PRINTED FOR THE MUSEUM.
APRIL, 1902.

APR 26 1902

No. 2. — *Chiriqui Mammalia*. By OUTRAM BANGS.

FOR nearly a year Mr. W. W. Brown, Jr., collected in Chiriqui for my brother, Edward A. Bangs, and myself. During this time he obtained, in addition to an extensive series of birds, an account of which I have already published,¹ upwards of 500 mammals. These have been presented to the Museum of Comparative Zoölogy, and form the subject of the present paper.

Chiriqui is a region of considerable interest, both from its position between Costa Rica and Panama, and from the lofty Volcan de Chiriqui, which rises to a height of 11,500 feet, and with its slopes and foot-hills forms the principal part of the small province of Chiriqui. Our present knowledge of the mammals is confined wholly to those of the foot-hills with an altitude of from 600 to 800 feet. Mr. H. J. Watson, the owner of extensive plantations at Bogaba, has sent many mammals to the British Museum. From this source Dr. Oldfield Thomas has described a number of new species, and Mr. G. S. Miller, Jr., one species. Unfortunately Dr. Thomas has not published a list of the species sent him; he has described such as were new, and his descriptions are not only scattered, but extend over a period of several years.

The stations at which Mr. Brown collected are as follows: Divala, situated in the lowland forested country, practically sea level; Pedregal on the Pacific coast; Bogaba, in the foot-hills of the Volcan de Chiriqui, 600 feet altitude, aneroid (800 feet according to Dr. Oldfield Thomas); Boquete, on the southern slope of the Volcan de Chiriqui, 3,000 to 5,000 feet altitude (some specimens even up to 7,000 feet, labelled "Boquete," were taken directly above that little village); and the summit of the Volcan de Chiriqui at and near timber line, 10,000 feet and upwards. Thus Mr. Brown covered the various life zones of the Volcan de Chiriqui and the results are of the greatest interest.

¹ Auk, Vol. XVIII. pp. 355-370, Oct. 1901, and Proc. New Eng. Zoöl. Club, Vol. III. pp. 15-70, Jan. 30, 1902.

The forms from the top of the Volcano are very different from those of the lowlands and foot-hills. In my paper in the Proceedings of the New England Zoölogical Club I give extracts from Mr. Brown's itinerary, which, though of interest to mammalogists as well as ornithologists, need not be repeated here.

Mr. Brown took the altitudes with an aneroid.

The mammals that have been described from Chiriqui are as follows: *Caluromys laniger pallidus* Thomas, *Tylomys watsoni* Thomas, *Oryzomys tectus* Thomas, *Proechimys centralis chiriquinus* Thomas, *Dasypterus ega panamensis* Thomas, *Artibeus watsoni* Thomas and *Promops nanus* Miller, all from Bogaba, while *Sciurus melania* (Gray) was named from Point Burica, Costa Rica, just north of Chiriqui, and *Galera barbara biologæ* (Thomas) was founded on a specimen from Calovevora, Veragua, Panama, just south of Chiriqui. Mr. Brown secured specimens of all of these except *Oryzomys tectus*, *Dasypterus ega panamensis*, *Artibeus watsoni*, and *Promops nanus*.

In the present paper I describe as new one genus, *Syntheosciurus*, and fourteen species and four subspecies: — *Tayassu crusnigrum*, *Sciurus æstuans chiriquensis*, *Sciurus browni*, *Syntheosciurus brochus*, *Megadontomys flavidus*, *Peromyscus cacabatus*, *Nyctomys nitellinus*, *Sigmodon austerulus*, *Oryzomys devius*, *Oryzomys vegetus*, *Reithrodontomys australis vulcanius*, *Reithrodontomys creper*, *Akodon teguina apricus*, *Akodon xerampelinus*, *Macrogeomys cavator*, *Macrogeomys pansa*, *Heteromys repens*, *Agouti paca virgatus*.

The systematic sequence is that of Miller and Rehn in their recent list. All the measurements are in millimeters, and except the skull measurements, which are mine, are those of the collector. Color names are according to Ridgway's nomenclature. As descriptions of skulls are frequently inadequate, I give figures, from the drawings of Dr. J. C. McConnell, in all cases of importance.

In the identification of the species I have been assisted by Mr. Gerrit S. Miller, Jr., Mr. E. W. Nelson, and Mr. W. H. Osgood, to all of whom I express my sincerest thanks. Dr. J. A. Allen, of the American Museum of Natural History, and Dr. C. Hart Merriam, of the United States Biological Survey, have most kindly loaned specimens that were of the utmost importance.

Marmosa mexicana (MERRIAM).

Four specimens, an old adult ♂ from Boquete, 4,000 feet, and three young from Bogaba, 600 feet, February and July.

These appear to be identical with specimens from Southern Mexico, States of Chiapas and Vera Cruz. The old ♂ is much larger than any Mexican example I have seen, but is much older also, and the difference in size seems to be wholly due to age. *M. mexicana* is a very distinct species, differing from the South American forms of the *M. murina* series in its reddish chestnut coloring, without olive shades, and certain cranial characters; the nasals are short and truncate posteriorly, the interorbital region wide, the supraorbital beading slight; a still more marked character is the two parallel temporal ridges, extending the length of the brain case and ending one on each side of supraoccipital.

M. mexicana is wholly different from *M. fulviventris*, lately described by me from San Miguel Island, Bay of Panama.

The old adult ♂ No. 10,154, measures, total length, 370; tail vertebrae, 195; hind foot, 25; ear, 25. Skull, basal length, 38.4; occipitonasal length, 41; zygomatic width, 22.2; length of nasals, 17.8.

Caluromys laniger pallidus (THOMAS).

Type Locality. — Bogaba, Chiriqui.

Six adults, both sexes. Bogaba and Divala, November, December, and July.

Metachirus fuscogriseus ALLEN.

Four adults, both sexes, Boquete, 4,500 feet, and Bogaba, March and July. These specimens are referable in every way to Dr. Allen's species, the type locality of which was not known. Dr. Allen, however, later refers Nicaraguan examples to it; thus the range of *M. fuscogriseus* extends certainly from Nicaragua to Chiriqui. The largest individual, No. 10,146, ♂ old adult, measures, total length, 620; tail vert., 315; hind foot, 47; ear, 33.

Didelphis richmondi ALLEN.

Type Locality. — Greytown, Nicaragua.

Six adults, both sexes, Boquete, 4,000 to 5,800 feet, March.

Dr. Allen now refers Costa Rican specimens, that he formerly called *D. aurita*, here. Mr. Brown's record carries the range of the species a little farther south. All the examples agree in every way — size, color, color pattern, skull characters — with Dr. Allen's description.

Choloepus hoffmanni PETERS.

Five specimens, both sexes, young and adult, Boquete, 4,000 to 4,800 feet, and Bogaba, March, April, and July.

Cyclopes dorsalis (GRAY).

Nine specimens, both sexes, young and adult. Divala and Bogaba, December and July.

Although in September, 1900, Dr. Oldfield Thomas pointed out anew the differences between the Central American *C. dorsalis* and the typical *C. didactylus* of Guiana, and though it had stood in Trouessart's Catalogue as a subspecies, it is omitted by Miller and Rehn in their recent list.

Uroleptes sellata (COPE).

Two specimens; adult ♀, Divala, December; adult ♂, Volcan de Chiriqui, 5,000 feet, May.

Myrmecophaga tridactyla LINN.

One adult, Divala, December.

Tayassu crusnigrum, sp. nov.

Type. — Mus. Comp. Zoöl., No. 10,163. Young ad. ♂, Boquete, April 13, 1901, 4,000 feet.

Three specimens, both sexes, one young, one young adult, one old adult, Boquete, 4,000 to 5,800 feet, March and April.

Characters. — Probably nearest to *T. angulatus humeralis* Merriam (Mexico, Colima to Tehuantepec), but much darker throughout; legs and arms almost wholly black; dorsal black band wide; shoulder stripes wide and conspicuous, tawny in color; pelage rough and coarse; skull wider above and narrower below; rostral portion wider; palate much narrower, tooth rows nearer together.

Color. — Legs, arms, central dorsal, and central ventral stripes, black; rump mostly black, a few of the hairs (bristles) annulated with tawny; conspicuous shoulder stripes, tawny; sides of head and of body, mixed tawny and black; all the hairs annulated with these colors; hairs on outer surface of ears mostly black, those on inner surface mostly tawny, the general effect being that of a very dark, richly colored peccary.

Measurements —

No.	Sex.	Total length.	Hind foot (with hoof).	Ear.
10,162	old ad. ♀	1030	170	80
10,163	type; young ad. ♂	860	145	76
10,164	young ♀	775	135	72

Skull, No. 10162, old adult ♀, from Boquete 5,800 feet, basal length, 197; occipitonasal length, 222; zygomatic width, 103; greatest width across squamosals posteriorly, 98; palatal length to palatal notch, 140; breadth of basioccipital between bullæ posteriorly, 19; length of upper molariform series, 64.

Remarks. — I do not give this fine new peccary as a subspecies of *Tayassu angulatus* (Cope) because the relationships of the North American forms and the South American *T. tajacu* are not as yet clearly understood. It is very different from any of the forms lately described by Doctor Merriam, and is even more widely separated from my *T. torvus* of the Santa Marta region of Colombia. The two younger specimens agree in coloration, but the old ♀, No. 10,162, is slightly different; the bristles of the rump are rather more annulated, and the color of the lighter rings on the bristles here and on the sides is paler — yellowish white instead of tawny. The color of the shoulder stripes and the head and neck is as in the other species. It is in rather worn pelage, and as these differences may be due to actual fading, I select a younger individual, in fine pelage for the type.

A white-lipped peccary also occurs in Chiriqui. Mr. Brown saw them several times, but those wounded escaped in the dense jungle.

Odocoileus¹ sp.?

One young ♂, Boquete, 4,000 feet, April 10. This specimen is in the spotted pelage, and is too young to identify. The species was rare, but was well known to the native hunters.

Mazama sartorii (SAUSSURE).

Three adults, two males and a ♀, Boquete, 4,000 to 4,800 feet, March and April.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,158	old ♂	1330	. .	260	84
10,159	old ♂	1340	100	255	76
10,160	old ♀	1360	105	240	78

¹ For use of *Dama* instead of *Odocoileus*, see Allen, Bull. Am. Mus. N. II., Vol. XVI. pp. 18-20, Feb. 1, 1902. I am as yet not satisfied as to the correctness of Dr. Allen's contention.

Elasmognathus bairdii GILL.

One fine old adult ♂, Boquete, 5,000 feet, March.

Sciurus (Echinosciurus) melania (GRAY).

Twenty-one specimens, adults of both sexes, and young, Divala, Bogaba, and Boquete, 2,000 feet, November, December, January, and July.

This fine, large black squirrel, described by Gray in 1867 from Point Burica, Costa Rica, was unknown to Nelson when he wrote his Revision of the Squirrels of Mexico and Central America. In a foot-note on page 74 he says: "This may be a valid species or subspecies, but the type was evidently a melanistic specimen, and in the absence of material I refer it here" (to *Sciurus adolphei dorsalis* (Gray)). The large series collected by Brown shows that Gray's type was not melanistic, and that the animal is a fine distinct species. It probably has a very restricted range; so far as I know, it has not been taken in Costa Rica, north of the very southern part, bordering Chiriqui, the locality of Gray's type. It is a low land species, and not found high up the Volcan de Chiriqui, 2,000 feet being the extreme altitude at which Mr. Brown saw it, and but once so high as that. About Bogaba (600 feet) and Divala, it is common and generally distributed in suitable places.

In normal, fresh pelage it is nearly black all over, the back only being a dark chocolate. As the pelage becomes shabby from wear, the back and tail fade to a dull yellowish brown color, the rest of the animal remaining dull black. In many of these faded specimens, fresh hairs appear in patches, and these are of the normal, beautiful dark chocolate color. *Sciurus melania* is a beautiful squirrel, the pelage has a sheen quite peculiar, and the chocolate of the back is very rich, an unusual color in mammals. The young are like the adults. Fully adult specimens usually measure, total length, 500; tail vertebrae, 260; hind foot, 63; ear, 30. The very largest have a total length of 560.

Sciurus (Guerlinguetus) æstuans chiriquensis, subsp. nov.

Type. — Mus. Comp. Zoöl. No. 10,044, ad. ♂, Divala, Nov. 18, 1900.

Forty-one specimens, both sexes, young and adult, Divala, Boquete, and Volcan de Chiriqui, 4,000 to 7,500 feet, and Bogaba, November, December, February, March, April, and July.

Characters. — Very similar to *S. æstuans hoffmanni* Peters from Costa Rica in all respects, except a constant, well-marked difference in general coloration. The under parts, paler, yellower, less brick-red; the upper parts more olivaceous, less brick-red. A large series of the two forms shows this difference in color to be well marked at all seasons.

Color and Pelage. — Pelage, short and rather hispid, with scarcely any under-fur. Upper parts, finely mixed (owing to the annulations of the hairs) blackish brown (perhaps nearest mummy brown) and tawny, the tawny color predominating on sides, the dark brown color along middle of back; orbital ring, back of ear and a small spot just behind ear clear tawny; under parts tawny, becoming yellower, about raw sienna on under side of neck and head, and often the breast similarly colored; tail much the same as back, but with the tawny annulations wider; deeply fringed along sides with clear tawny, under side darker than upper.

Variations in Color. — The large series before me presents very little color variation, and apparently no seasonal variation in color; a few specimens only in very worn pelage are duller, more rusty brown above, due to actual fading; the amount of the yellowish color (raw sienna to ochraceous) that always occupies the under side of head and neck varies in different individuals — in two extreme specimens, Nos. 10,416, and 10,038, ♀ and ♂ adults, it covers the whole under parts, there being no tawny. There are also three albinistic specimens, irregularly marked with white on under parts and feet.

Skins from the Volcan de Chiriqui from upwards of 4,000 feet altitude are more woolly with decidedly more under fur than lowland examples, but otherwise they do not differ.

Measurements (ten adults type and topotypes)—

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,044 type	♂	400	190	52	20
10,038 topotype	♂	460	190	55	18
10,042 do.	♂	460	220	55	24
10,040 do.	♂	440	185	53	20
10,047 do.	♂	440	185	54	22
10,041 do.	♂	425	190	57	23
10,036 do.	♀	410	180	55	23
10,045 do.	♀	410	180	54	23
10,043 do.	♂	410	180	56	24
10,039 do.	♂	395	185	54	24

Skull, type, adult ♂, basal length, 46.2; occipitonasal length, 54; zygomatic width, 31.4; length of nasals, 16.4; length of palate, to palatal notch, 23.2; to end of pterygoid, 30.

Remarks. — This new form which is found apparently throughout Chiriqui, in suitable places, is a slightly differentiated southern race of *S. hoffmanni* of Costa Rica. It is distinguished by paler under parts, which are much yellower, less brick-red, and by the different shade of the upper parts. I do not believe that *S. hoffmanni* is a subspecies of *S. æstuans* of South America, but as this has been the view taken by recent reviewers of the group, for the sake of uniformity I so treat it here.

Sciurus (Microsciurus) browni,¹ sp. nov.

Type. — Mus. Comp. Zoöl., No. 10,404, old ad. ♂ Bogaba, July 15, 1901.

Five specimens, both sexes, Bogaba, July.

Characters. — Probably nearest to *S. alfari* Allen, from Costa Rica, but differing in many respects from that species. Pelage *much* thinner, less woolly; upper parts decidedly more olivaceous — lacking the reddish brown of *S. alfari*; tail thinly washed with grayish white instead of dull rusty; nose, forehead, and orbital ring more tawny; under parts *much* paler; in the new species dull gray slightly washed with buffy in some specimens, yellowish white in others, on under side of neck and middle of belly, in *S. alfari* the under parts are dull rusty on under side of neck and breast with a thin wash of this color extending back over belly, which has a dull brown shade.

The skull is similar to that of *S. alfari*, but the brain case is narrower, more rounded and without so marked a constriction in front of the occiput, and with the mastoid region less prominent.

Color and Pelage. — Pelage short and thin, rather harsh and with but little under fur.

Upper parts, a fine mixture of tawny olive and bistre, produced by the dark brown bases and tawny olive tips of the hairs; nose, forehead, and orbital ring tawny; tail with the hairs dark reddish brown basally then black and tipped with grayish white, a small black pencil; under parts dull gray to grayish white, slightly washed with buffy or yellowish (in some specimens, very slightly in the type) on under side of neck and middle of belly; under sides of legs darker — more nearly like upper parts.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,404 type	♂ ad.	260	120	38	14
10,405	♀ ad.	255	100	38	14
10,407	♀ ad.	232	110	38	13
10,406	♀ ad.	250	110	36	14
10,408	♂ youngish	245	110	37	13

Skull, type, adult ♀, basal length, 29; occipitonasal length, 36; zygomatic width, 21.2; interorbital width, 12.4; palatal length, to palatal notch, 13.4; to end of pterygoid, 20.2; length of nasals, 11; length of upper molar series, 5.8.

Remarks. — Mr. Brown found this little squirrel in the forest about Bogaba, at 600 feet altitude. It was rare and exceedingly hard to get, on account of its small size and dull coloring, and only by devoting much time and energy to the chase did he succeed in taking five specimens.

Mr. E. W. Nelson has compared very carefully these five specimens with the type of *Microsciurus alfari* Allen, and agrees with me as to the specific differences between these two tiny tree squirrels.

¹ Named for Mr. W. W. Brown, Jr.

Syntheosciurus,¹ gen. nov.Type: *Syntheosciurus brochus*, sp. nov.

Characters. General external appearance much as in *Microsciurus*, but ear still smaller, hardly standing up above the fur, and very woolly; pelage very long, dense, and woolly; size larger than usual in *Microsciurus*; skull and teeth peculiar; skull very thin and papery, with very small, feeble, constricted rostrum, with the upper outline (of rostrum) straight; audital bullæ small; molar teeth as in *Microsciurus* and peg-like premolar present; incisors very slender and projecting outward (not curved under as usual in tree squirrels); upper incisors with a well-marked central groove down each.

Syntheosciurus brochus,² sp. nov.

Type. — Mus. Comp. Zoöl., No. 10,402, ad. ♂, Boquete, April 30, 1901. 7,000 ft.

Two adults, ♂ and ♀, Boquete, 7,000 ft. altitude, taken together on April 30.

Characters. — Size intermediate between *Microsciurus* and *Guerlinguetus*; tail a little less than length of head and body, full and bushy; ear very low, round, and woolly; pelage very long, soft, and woolly, with very thick under fur; general coloration dark reddish olive, with under parts varying from orange rufous to ferruginous; no distinct line of demarcation between colors of upper and under parts; skull and incisor teeth peculiar (as pointed out in the description of genus).

Color. — Upper parts finely mixed olivaceous bistre and dull tawny olive — the hairs olivaceous bistre, tipped with dull tawny olive; under fur dark mouse-gray; orbital ring, sides of nose and chin tawny olive; tail similar to back, fringed along sides with pale rusty and slightly more reddish, less olivaceous below; under parts, especially along middle line, strongly suffused with orange rufous in the type (ferruginous in No. 10,403, nursing female).

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,402 type	♂ ad.	320	150	46	17
10,403	♀ ad.	315	145	46	16

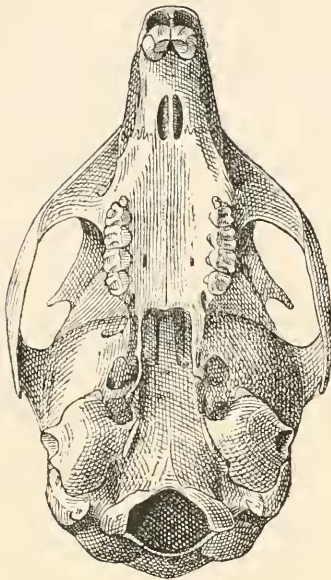
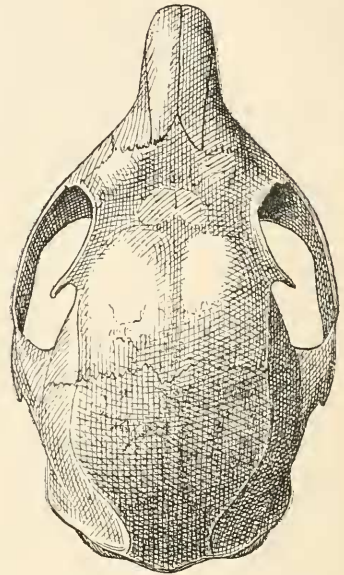
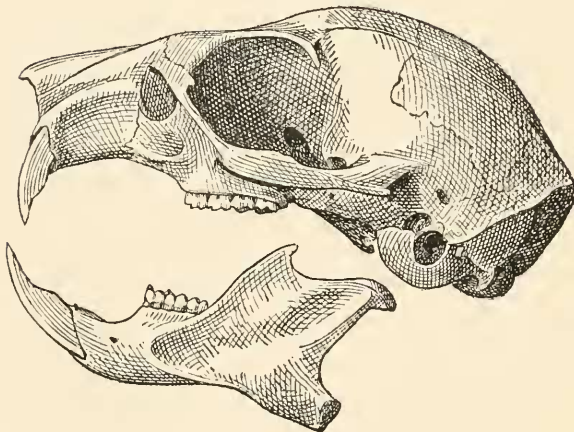
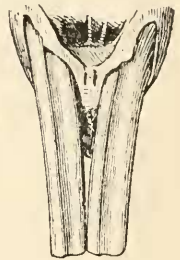
Skull type, adult ♂, basal length, 35.6; occipitonasal length, 44; zygomatic width, 25.2; interorbital width, 12.6; palatal length, to palatal notch, 20; to end of pterygoid, 27.4; length of nasals, 13; width of nasals, 5.8; length of upper molar series, 7.6; length of single half of mandible, 27.

Remarks. — Mr. Brown met with this remarkable squirrel but once, when he took the pair described. It was unknown to the native hunters who ac-

¹ Σκιουρος = squirrel, and Σύνθετος = combined.

² *Brochus*, with projecting teeth.

accompanied him, and who expressed much astonishment on being shown the two examples. Judging by the long, dense fur, even at this time of year —

1. $\times 1\frac{3}{4}$ 2. $\times 1\frac{3}{4}$ 3. $\times 1\frac{3}{4}$ 4. $\times 4$

FIGS. 1, 2, 3, AND 4. *Syntheosciurus brochus*. Type.

April 30 — when the female was nursing young, it is evidently an animal of high elevations only.

Among tree squirrels, *Syntheosciurus brochus* has no very near ally; its light, papery skull recalls that of *Sciuropterus*, but the audital bullæ are much smaller. Its peculiarly straight, slender rostrum, weak, projecting, and grooved incisors at once distinguish the genus from any other.

Mus rattus Linn.

One youngish ♀, Boquete, 4,800 ft. Mar.

*Megadontomys*¹ *flavidus*,² sp. nov.

Type. — Mus. Comp. Zool. No. 10,321, ad. ♂, Boquete, April 12, 1901. 4,000 ft.

Twenty-seven specimens, Boquete, 3,000 to 5,000 ft., February and April.

Characters. — A large species, much paler and yellower than *M. thomasi* Merriam, Mountains near Chilpancingo, Mexico, 9,700 ft., and *M. nelsoni* Merriam, Jico, Mexico, altitude 6,000 ft.; skull with much more rounded and elevated and less flattened brain case; palatal slits very wide; audital bullæ decidedly small; ears small.

Color. — Upper parts brownish cinnamon, usually rather more rusty toward rump, brighter, inclining toward orange-buff along lower sides; a large, conspicuous blackish patch on each side of head at base of whiskers; whiskers mixed black and colorless; underparts white, the gray basal portion of the hairs showing through; a slight collar yellowish or buffy; feet and hands whitish, marked with brown about ankles and wrists; tail sparsely clothed with short stiff hairs, dusky above, grayish below; ears nearly naked, dusky outside, slightly silvery inside. Young examples differ from the adults in being darker and duller brown above; the under parts more grayish, less purely white.

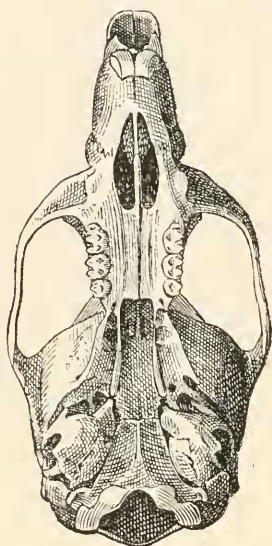
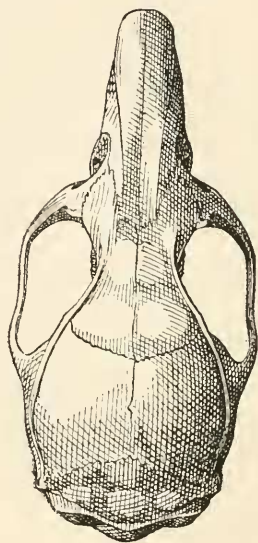
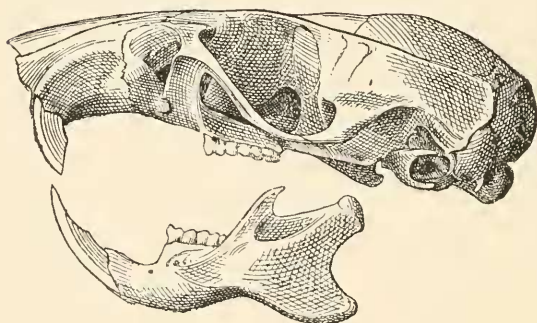
Measurements (of ten adults, type and topotypes) —

No.	Sex.	Total length.	Tail vert.	Hind Foot.	Ear.
10,327	♂ old ad.	375	205	31	23
10,329	♂ old ad.	355	195	32	23
10,333	♂ old ad.	350	185	32	24
10,339	♂ ad.	345	185	32	22
10,336	♂ ad.	345	187	32	23
10,331 type	♂ ad.	336	180	31	23
10,328	♂ ad.	335	155	32	20
10,338	♂ ad.	330	185	32	22
10,342	♂ ad.	325	170	31	23
10,330	♀ ad.	320	165	33	22

¹ Though described by Dr. Merriam as a subgenus of *Peromyscus*, *Megadontomys* is entitled to generic rank, on account of the unwieldy proportions of *Peromyscus*.

² *Flavidus*, yellowish.

Skull type, ♂ adult, basal length, 35.4; occipitonasal length, 40.2; zygomatic width, 19.6; mastoid width, 15; length of nasals, 17.8; width of nasals, 4.8; length of palatal slits, 7.4; width of palatal slits, 3.4; length of palate, to palatal notch, 17; to end of pterygoid, 24.4; length of upper molar series 5.6; length of single half of mandible, 21.8.

5. $\times 1\frac{1}{2}$ 6. $\times 1\frac{1}{2}$ 7. $\times 1\frac{1}{2}$ FIGS. 5, 6, AND 7. *Megadontomys flavidus*. Type.

Remarks. — The Volcan de Chiriqui is thus far the southernmost point from which a species of this well-marked group of Vesper Rats has been recorded. *Megadontomys flavidus* was common in the upland forest from 3,000 to 5,000

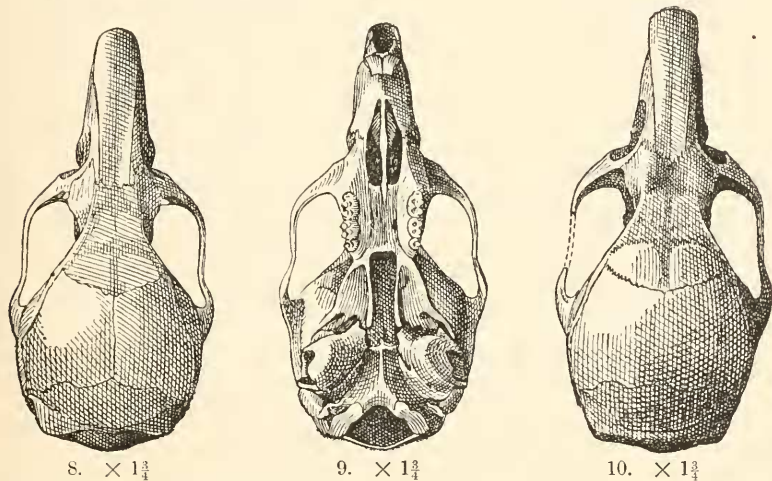
feet, but was not taken above or below these heights. While showing the group characters quite as strongly as either of its Mexican congeners, *M. flavidus* is very different specifically; its yellowish coloration and rounded elevated brain case at once distinguishing it.

Peromyscus cacabatus,¹ sp. nov.

Type. — Mus. Comp. Zool., No. 10,225, ad., ♀ Boquete, April 22, 1901. 5,000 feet.

One hundred and thirty-one specimens, Boquete, 4,000 to 7,500 feet, January to April.

Characters. — Probably nearest to *P. guatemalensis* Merriam (Todos Santos, Guatemala, 10,000 feet), tail shorter and colors not so dark; palatal slits shorter and wider; nasals in old age, more expanded at tips, like those of *P. furvus* Allen and Chapman.



FIGS. 8 AND 9. *Peromyscus cacabatus*. Type.

FIG. 10. *P. cacabatus*, very old ♂. No. 10,202, to show expansion of nasals in old age.

Color. — A broad dorsal band sooty, becoming less intense and browner on sides of back and gradually passing into dull orange-buff on lower sides; sides of nose, at base of whiskers, dull grayish or buffy white; top of nose, space between base of whiskers and eye, and orbital ring black; under parts — a broad pectoral collar, dull orange-buff, rest of under parts varying from dull grayish white to strong pinkish buff, — usually with chin and throat grayish white, and belly grayish white, washed with pinkish buff —; feet and hands, whitish; ears, nearly naked, dusky; tail nearly naked, dusky above, usually pale, yellowish gray below (the tail is very variable, the paler color below is

¹ *Cacabatus*, sooty (color).

often in patches, or spots, sometimes occupying nearly the whole of the under surface, sometimes wholly wanting; and in some specimens the upper surface also is patched with whitish). Very old examples are paler above with the sooty dorsal stripe, less well marked; younger specimens are darker, often with most of the back sooty.

Measurements (of ten adults, type and topotypes). —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,204	♂ old adult	270	135	26	21
10,202	♂ old ad.	265	128	26	21
10,218	♀ old ad.	265	130	25	21
10,211	♂ old ad.	265	125	25	20
10,199	♂ ad.	260	126	26	20
10,225	♀ ad. (type)	260	128	26	20
10,205	♂ ad.	257	125	26	20
10,212	♂ ad.	255	120	26	20
10,244	♀ ad.	255	120	27	21
10,198	♂ ad.	252	120	26	21

Skull, type, adult ♀, basal length, 28.8; occipitonasal length, 32.4; zygomatic width, 15.6; mastoid width, 13.6; length of nasals, 13; width of nasals, 3.4; length of palatal slits, 6.2; width of palatal slits, 3.2; length of palate, to palatal notch, 12.8; to end of pterygoid, 19; length of upper molar series, 5; length of single half of mandible, 17.4.

Remarks. — *Peromyscus cacabatus* was by far the commonest small mammal of the mountain forest belt of the Volcan de Chiriqui. It does not appear to occur below 4,000 feet, and extends from thence upward to the limit of the life zone it occupies, roughly speaking, about 8,000 feet, 7,500 feet is the highest altitude marked on any of the labels. The Mount Chiriqui *Peromyscus*, is most nearly allied to *P. guatemalensis* and *P. furvus*, but is quite distinct. It is the most southern member of the genus thus far recorded.

*Nyctomys*¹ *nitellinus*,² sp. nov.

Type. — Mus. Comp. Zoöl., No. 10,249, old ad. ♀, Boquete, Feb. 8, 1901. 4,000 feet.

Six specimens, Boquete, 4,000 to 6,000 feet, January, February, and March.

Characters. — Apparently a very distinct species, though nearest to *N. decolorus* (True) from Rio de las Piedras, Honduras. Color of back, pale and yellowish, but decidedly darker than in *N. decolorus*. Also larger than *N. decolorus*; tail more hairy; skull much larger, with narrower posterior part;

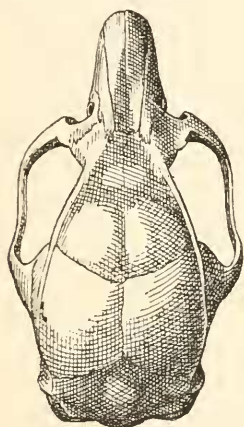
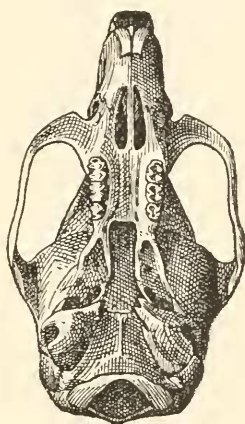
¹ I think all mammalogists must now regard the very well marked Central American hairy-tailed Vesper rats, as generically distinct from *Rhipidomys*. The important characters are four instead of six mammae, very slender, short rostrum, exceedingly short palatal slits and peculiarly expanded brain case. The synonymy is: *Nyctomys* Sauss. 1860; type, *N. sumichrasti*; *Myozomys* Tomes, 1861; type, *M. salvini*.

² *Nitellinus*, like a dormouse.

interparietal narrower; palatal slits much narrower and longer — less rounded in shape.

From *N. sumichrasti* or *N. salvini* (probably distinct species, as suggested by True, Proc. U. S. Nat. Mus., Vol. XVI. p. 690), the new species differs in its much yellower less ferruginous color above, in its blackish ears and tail, and in its larger size.

Color. — Upper parts, yellowish cinnamon, duller, more isabella color on top of head, darkened along middle of back, head, and rump by a slight admixture of brown tipped hairs; lower sides brighter, decidedly shaded with orange-buff; orbital ring and space between base of whiskers and eye black; top of nose pale isabella color; whiskers, very long, mixed black and colorless; under parts, pure, snowy white to base of hairs; ears, sparsely haired dusky; tail

11. $\times 1\frac{3}{4}$ 12. $\times 1\frac{3}{4}$ FIGS. 11 AND 12. *Nyctomys nitellinus*. Type.

well haired, the hairs gradually becoming longer toward tip, and ending in a pencil, unicolor, blackish; hands white; feet — toes and sides of tarsus white, central portion of tarsus, dark brown.

The type and Nos. 10,245 and 10,246 are practically alike in color, the other three, all younger, are paler, grayer, more isabella color above; the lower sides are cinnamon without the bright orange-buff shade of the older specimens.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,247	♀ ad.	250	120	25	17
10,248	♀ ad.	250	125	25	17
10,249 type	♀ old ad.	260	125	24	17
10,250	♂ young	215	90 ¹	23	16
10,246	♂ old ad.	240	107 ¹	22	17
10,245	♂ ad.	185	55 ¹	25	17

¹ End of tail gone.

Skull, type, ♀ old adult, basal length, 28; occipitonasal length, 32.4; zygomatic width, 18; mastoid width, 13; interorbital width, 11; length of nasals, 10.6; width of nasals, 3.2; length of palatal slits, 4.6; width of palatal slits, 2.2; length of palate, to palatal notch, 12.4; length of upper molar series, 4.8; length of single half of mandible, 18.

Remarks. — I have compared the series of *N. nitellinus* with the type of *N. decolorus* and the other species of this group in the United States National Museum, and while most nearly allied to the species from Honduras, I find excellent specific characters, both external and cranial for the separation of *N. nitellinus*.

Tylomys watsoni THOMAS.

O. Thomas, *Ann. and Mag. of N. H.*, 7th Series, IV., p. 278, 1899.

Type locality. — Bogaba, Chiriqui.

Four specimens; adult ♂ and ♀ and a young ♂, Bogaba, July, and a half grown young one from Boquete, 5,600 feet, March.

The specimens from Bogaba are not only topotypes, but were caught on the banks of the same stream as the type.

Measurements of the four specimens —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,254	♀ old ad.	455	235	40	27
10,251	♂ old ad.	440	235	42	25
10,252	♂ yg. Boquete.	380	195	35	22
10,253	♂ very yg.	260	125	32	18

Sigmodon borucæ, ALLEN.

Three adults, Bogaba, July.

These appear to be identical with Allen's *S. borucæ* of Boruca, Costa Rica. The measurements are —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,287	♀ old ad.	280	105	32	19
10,285	♂ ad.	260	110	30	17
10,286	♂ yg. ad.	245	100	30	18

Sigmodon austerulus,¹ sp. nov.

Type. — *Mus. Comp. Zool.*, No. 10,288, ad. ♂, Volcan de Chiriqui, June 1, 1901. 10,000 feet.

Characters. — About the size of *S. borucæ*; tail longer; pelage much more hispid; colors all much paler; skull similar.

¹ *Austerulus*, somewhat harsh.

Color. — Upper parts cinnamon brown darkened along middle by the admixture of dark brown tipped hairs, somewhat shaded with russet on rump and flanks; under parts white washed with pale buff, sharply contrasted against color of upper parts: ears dusky with some hairs on both surfaces colored like those of the back: feet and hands yellowish gray (much paler than in *S. boruce*). tail thickly clothed with short, stiff, close hairs, dusky above, gray below.

Measurements. — Type, adult ♂, total length, 260; tail vertebræ, 120; hind foot, 32; ear, 17.

Skull (an adult with somewhat worn teeth; unfortunately it was broken by the trap directly across between the orbits) — mastoid width, 14.8; upper molar series, 6; length of single half of mandible, 19.2.

Remarks. — The *Sigmodon* of the low lands of Chiriqui is a small dark colored species with very soft pelage, that I cannot distinguish from *S. boruce* of the low lands of Costa Rica.

When Dr. Allen described that animal he spoke of specimens from San José 5,000 feet altitude, that had hispid pelage, but otherwise did not differ.

The one example from the top of the Volcan de Chiriqui, differs from *S. boruce* of the adjacent low lands not only in having much more hispid pelage, a much paler coloration throughout, but also a longer tail.

In the forest belt of the Volcan, where Mr. Brown did much trapping, he did not find *Sigmodon*, and for that reason I give full specific rank to the form of the summit of the Volcan de Chiriqui. It has been my experience that *Sigmodons* love open fields, savannahs, brushy places, and waste land, and avoid the dense forest.

Oryzomys alfaroi (ALLEN).

Fourteen specimens, Boquete, 4,000 feet, February and April; Divala, December.

I have compared this series with specimens from Tins, Costa Rica (the type locality of the species is San Carlos, Costa Rica) sent me by Dr. Allen, and can detect no differences.

Measurements (of six adults from Boquete) —

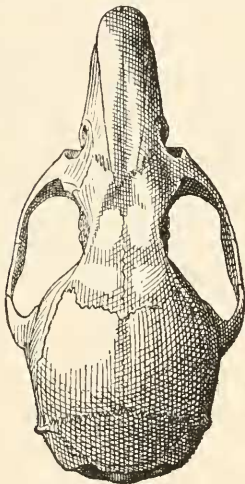
No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,315	♀	235	120	26	16
10,322	♂	225	110	26	16
10,311	♂	225	105	26	15
10,314	♂	215	105	23	15
10,316	♀	215	110	26	15
10,320	♂	210	105	25	15

Oryzomys devius,¹ sp. nov.

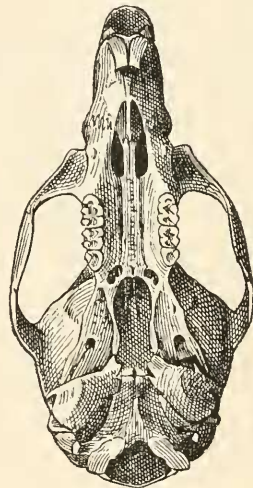
Type. — Mus. Comp. Zoöl., No. 10,324. Young ad. ♀, Boquete, Jan. 29, 1901.
5,000 feet.

Four specimens, Boquete, 4,000–5,000 feet altitude, January and February.

Characters. — A large species belonging to the *Oryzomys meridensis* group. Externally quite like *O. childi* of the Bogota region of Colombia, except in the color of the under parts, which are white and fulvous in patches, instead of being white and gray in patches. The skull shows many good characters distinguishing it from that of *O. meridensis*. It is slightly larger, with longer rostrum, wider between orbits; the palatal slits are about the same length, but much wider; audital bullæ larger.



13. $\times 1\frac{3}{4}$.



14. $\times 1\frac{3}{4}$.

FIGS. 13 AND 14. *Oryzomys devius*. Type.

Color. — Upper parts, rich, lustrous russet-brown, slightly darkened along middle of back by sprinkling of dark brown tipped hairs, paler, brighter, more rufous on sides; top of nose, base of whiskers and region about eye, blackish; upper surface of legs and arms dusky brown; under parts variable (as in all members of this group), under side of head and neck grayish white, a pectoral and a ventral patch, white; the hairs scarcely gray at base, the region between these patches grayish white in No. 10,340, strong ochraceous buff, the hairs deep gray at base in the other three skins; ears large, nearly naked, black; feet and hands yellowish white; tail nearly naked, dusky above, grayish below.

¹ *Devius*, dwelling in lonely places, etc.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,340	♂ old ad.	360	195	35	22
10,326	♀ ad.	345	185	36	23
10,324 type	♀ yg. ad.	335	180	33	22
10,325	♀ yg. ad.	333	165	33	22

Skull. — Type, ♀, young adult, basal length, 31.6; occipitonasal length, 36; zygomatic width, 18; mastoid width, 13.8; interorbital width, 5.6; length of nasals, 14.2; width of nasals, 3.8; length of palatal slits 5.6; width of palatal slits, 2.6; length of palate, to palatal notch 15.6; upper molar series, 5.4; length of single half of mandible, 20.

Remarks. — *Oryzomys meridensis* Thomas, originally described from Merida, Venezuela, has a very extended distribution in South America, and several names have been bestowed upon it in different parts of its range. Dr. Thomas does not look with much favor upon these supposed races, and is inclined to unite them all. Those that I have seen specimens of are, *O. childi* of the Bogota region of Colombia and *O. maculiventer* Allen, of the Santa Marta district of Colombia. I cannot see that these two differ in any way. The Chiriqui form is also similar to these externally, except for the somewhat differently colored under parts; it has, however, good cranial characters to distinguish it.

***Oryzomys (Oligoryzomys) costaricensis* ALLEN.**

Five specimens, Boquete, 3,800 to 4,800 feet, April and March, Bogaba, July.

The type locality of this species is El General, Costa Rica, 2,150 feet altitude. To it I refer five out of the eighteen specimens of Pigmy *Oryzomys* that Mr. Brown took in Chiriqui; the other thirteen represent quite a different form.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,294	♀ old ad.	200	105	21	11
10,293	♂ old ad.	190	106	20	. .
10,296	♂ ad.	190	105	22	14
10,307	♀ ad.	190	105	21	12
10,299	♂ yg. ad.	180	100	21	12

***Oryzomys (Oligoryzomys) vegetus*,¹ sp. nov.**

Type. — Mus. Comp. Zool., No. 10,298, old ad. ♀, Boquete, April 16, 1901. 4,000 feet.

Thirteen specimens, Boquete, 4,000–4,800 feet, February and April.

Characters. — Larger than *O. costaricensis*; hind foot larger; ear larger; color above darker, redder, below buffy instead of white; skull larger and

¹ *Vegetus*, active, sprightly.

heavier, wider, especially across forward part of zygoma incisor teeth orange (yellow in *O. costaricensis*).

Color. — Upper parts bright yellowish red brown, darkest along middle of back, and becoming strong orange rufous on rump and sides, sides of head and at base of whiskers; top of nose and head duller and more mixed with dark brown-tipped hairs; chin and under side of neck whitish, rest of under parts ochraceous buff, not sharply contrasted with color of sides; feet and hands yellowish white; ears dark brown outside, inside with hairs — rather sparse — colored like the back; tail dusky above, grayish below. Young examples differ little from the adults, except in being rather duller in color throughout.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,304	♂ old ad.	235	130	24	13
10,306	♀ old ad.	220	130	24	13
10,303	♂ ad.	215	120	25	13
10,298 type	♂ old ad.	210	120	25	14
10,302	♂ ad.	208	115	24	13
10,297	♂ ad.	206	120	24	13
10,295	♂ ad.	205	120	24	13
10,300	♂ yg. ad.	200	118	24	13
10,310	♂ yg. ad.	190	115	24	12
10,305	♂ yg. ad.	190	110	25	12
10,309	♂ yg.	170	98	22	12

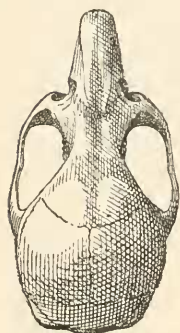


FIG. 15. *Oryzomys vegetus*. Type.

Skull. — Type, old ad. ♂, basal length, 20.2; occipito-nasal length, 24.4; zygomatic width, 12.6; mastoid width, 11; interorbital width, 3.4; length of nasals, 9; upper molar series, 2.8; length of single half of mandible, 12.4.

Remarks. — *O. vegetus* may prove to be only a northern subspecies of *O. dryas humilior* Thomas of Colombia, Bogota region to Santa Marta region. Though closely allied, the Chiriqui form has a shorter tail, is rather redder above, and slightly paler below, and its skull is decidedly heavier throughout.

On the Volcan de Chiriqui the two species of pigmy *Oryzomys* occur together. In the Santa Marta Mountains, where two species, *O. dryas humilior* and *O. narus*, also occur, the former was found from 8,000 to 9,000 feet only, and the latter from 3,000 to 8,000, their ranges just overlapping.

Zygodontomys cherriei (ALLEN).

One youngish ♀, Bogaba, July 3.

I have compared this example with topotypes, kindly loaned by Dr. Allen, and can find no differences. The type locality of the species is Boruca, Costa Rica, in the low lands.

The present specimen, not full grown, measures, total length, 195; tail vertebrae, 75; hind foot, 23; ear, 13.

Zygodontomys chrysomelas (ALLEN).

Three specimens, Bogaba, July.

It is possible that the Chiriqui form may prove to be subspecifically different from true *Z. chrysomelas* of Costa Rica (type locality Suerre). One specimen loaned by Dr. Allen from San Carlos, differs from the Bogaba examples in being smaller, with smaller skull, lighter rostrum, and broader palatal slits. Additional material, however, may show these differences to be individual.

The Vesper rats, related to *Z. chrysomelas*, of which there are several in South America, form quite a distinct group in the genus *Zygodontomys*, differing from the more typical members, in their very dark coloration, reddish bellies, nearly naked, dusky feet and hands, with white nails, and in their wider skulls — especially wide between the orbits — with strongly marked, overhanging superciliary beading.

Measurements (of the three Bogaba skins) —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,290	♂ old ad.	240	100	27	. .
10,291	♀ ad.	230	90	28	. .
10,292	♂ yg. ad.	215.	90	27	14

Reithrodontomys australis ALLEN.

Two specimens, adult ♂ and ♀, Boquete, 4,000 feet, April 30.

These I have compared with the type of *R. australis* from Volcan de Irazú, Costa Rica, loaned by Dr. Allen. In color they exactly agree, except that the upper surface of the feet is darker, more grayish — the feet being whitish in the type. The skulls of the two Boquete specimens, are heavier throughout especially the rostral part, and in this character they are intermediate between true *R. australis* and the form described below from the summit of the Volcan de Chiriqui.

Measurements (of the two Boquete skins) —

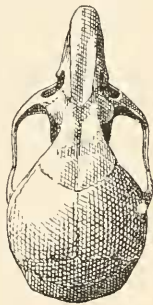
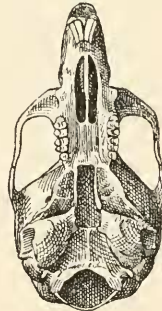
No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,282	♀ ad.	165	85	18	14
10,283	♂ ad.	155	75	19	12

Reithrodontomys australis vulcanius, subsp. nov.

Type. — Mus. Comp. Zoöl., No. 10,281, ad. ♂, Volcan de Chiriqui, May 26, 1901. 10,300 feet.

Characters. — Pelage extremely long and silky; colors much darker and grayer than in true *R. australis*; skull heavier, especially rostral portion; palatal slits longer and wider.

Color. — Broad dorsal band strong sepia, paling off on sides to isabella color, somewhat shaded with cinnamon; top of nose and head paler, grayer than back; under parts isabella color, strongly shaded with cinnamon between arms and about vent; feet and hands grayish; ears well haired, sepia (about the same shade as darker parts of back); tail well clothed with short, close hairs dusky above, grayish below.

16. $\times 1\frac{3}{4}$ 17. $\times 1\frac{3}{4}$ FIGS. 16 AND 17. *Reithrodontomys australis vulcanius*. Type.

Measurements. — Type, adult ♂, total length, 170; tail vertebrae, 95; hind foot, 19; ear, 14. Skull, basal length, 19.4; occipitonasal length, 22.8; zygomatic width, 11.4; mastoid width, 11; interorbital width, 3.4; length of nasals, 8.2; width of nasals, 2.6; length of palate to palatal notch, 9.2; length of palatal slits, 5; width of palatal slits, 1.8; upper molar series, 3.2; length of single half of mandible, 11.4.

Remarks. — *R. australis vulcanius* is a well marked alpine form, very different from true *R. australis* in color, and also in its exceedingly long, silky pelage. The skull is slightly different.

Reithrodontomys costaricensis ALLEN.

Thirty specimens, Boquete, 4,000 to 6,000 feet, January, February, April, and June.

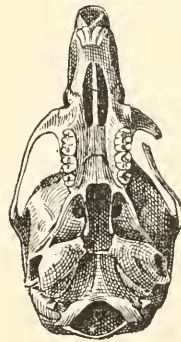
I have compared this series with specimens from the type locality — La Carpintera, Costa Rica — loaned by Dr. Allen, and cannot find that the Chiriqui animal is at all different. They vary a good deal individually in color, ranging from strong brownish orange rufous, without darker dorsal band to raw umber with darker dorsal band: below the color ranges from white to dull fulvous. Young individuals are always darker and duller than adults.

R. costaricensis was one of the commoner small mammals of the forest belt of the Volcan de Chiriqui.

Reithrodontomys creper,¹ sp. nov.

Type. — Mus. Comp. Zoöl., No. 10,284 ad. ♀ Volcan de Chiriqui, June 2, 1901.
11,000 feet.

Characters. — Belonging to a peculiar group of large-sized species with curious bird-like skulls, — very long slender rostrum and large round brain case. Pelage exceedingly long, dense, and silky; colors all very dark; hind foot very

18. $\times 1\frac{3}{4}$.19. $\times 1\frac{3}{4}$.FIGS. 18 AND 19. *Reithrodontomys creper*. Type.

large; tail, long. (Dr. Merriam has lately described several species of this group from Mexico. These should properly, I think, have a subgeneric name. None of them, however, are closely related specifically to the present one.)

Color. — Upper parts, middle of back, bistre, shading on sides to raw umber; face rather more dusky, especially about eyes and at base of whiskers: under parts dark cinnamon, without marked line of demarcation, but shading grad-

¹ *Creper*, dusky, dark.

ually into color of sides; toes and fingers, whitish; upper surface of feet and hands, brownish; ears, dusky; tail, dusky all round for two thirds of its length, white all around for the terminal third.

Measurements. — Type, adult ♀, with unworn teeth, total length, 215; tail vertebrae, 130; hind foot, 23; ear, 15. Skull, basal length, 21.4; occipito-nasal length, 25.4; mastoid width, 11.6; length of nasals, 8.8; length of palate to palatal notch, 10; length of palatal slits, 4.8; upper molar series, 4.2; single half of mandible, 13.6.

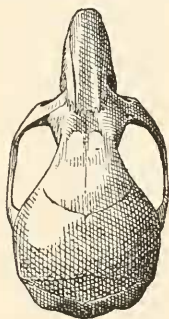
Remarks. — The type and only specimen of this remarkable little animal, is an adult ♀, but with unworn teeth, so probably it is not full grown, and old adults would be still larger. Externally it bears a somewhat superficial resemblance to the woolly *Oryzomys*, of the subgenus *Erioryzomys*. The single specimen was caught on the cold, barren summit of the Volcan de Chiriqui.

***Akodon teguina apricus*,¹ subsp. nov.**

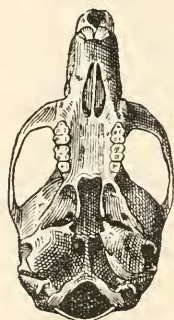
Type. — Mus. Comp. Zool., No. 10,236, old ad. ♀, Boquete, February 24, 1901.
4000 feet.

Five specimens, Boquete, 4,000 to 5,000 feet, February and April.

Characters. — Colors not so black as in true *A. teguina* (the rump and thighs in true *A. teguina* are blackish, in the new form they are scarcely darker than



20. $\times 1\frac{3}{4}$.



21. $\times 1\frac{3}{4}$.

FIGS. 20 AND 21. *Akodon teguina apricus*. Type.

the rest of the upper parts); tail, longer; ears, larger; skull, heavier; rostrum, heavier; molar-form teeth much heavier; tooth rows not so parallel, — much more divergent anteriorly. Pelage, short, close, and fine with decided gloss.

Color. — Upper parts vandyke-brown, slightly more dusky on top of head and along middle of back; under parts dull cinnamon rufous; hands, feet, ears, and tail blackish.

¹ *Apricus*, exposed to the sun, hence, southern.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,236 type	♀ old ad.	142	58	18	13
10,235	♀ old ad.	140	55	18	13
10,237	♀ old ad. ¹	140	55	18	13
10,234	♂ old ad. ¹	125	50	18	13
10,238	♀ ad.	125	55	18	13

Skull, type, old ad. ♀, basal length, 20.2; occipitonasal length, 23; zygomatic width, 12; mastoid width, 10.8; interorbital width, 4.6; length of nasals, 9; width of nasals, 2.8; length of palate, to palatal notch, 9.6; upper molar series, 4; length of single half of mandible, 12.8.

Remarks. — Through the kindness of Dr. Merriam I was able to compare the series taken by Mr. Brown with a fine adult ♂, No. 76,353, of true *A. teguina* taken by Mr. E. W. Nelson at Ocuilapa, Chiapas, Mexico. This comparison showed that the Chiriqui animal is quite distinct — though it is perhaps better to regard it as a subspecies.

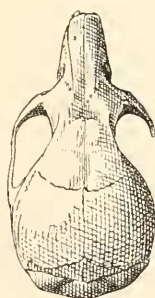
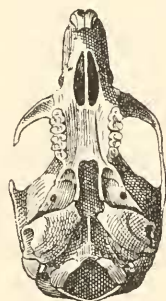
Mr. Brown caught all five of these curious dark brown little creatures, in open rocky places.

Akodon xerampelinus,² sp. nov.

Type. — Mus. Comp. Zool., No. 10,240, old ad. ♂, Volcan de Chiriqui, May 26, 1901. 10,300 feet.

Three specimens, Volcan de Chiriqui, 10,300 feet. May and June.

Characters. — Apparently specifically distinct from *A. teguina*. Size of that

22. $\times 1\frac{3}{4}$.23. $\times 1\frac{3}{4}$.FIGS. 22 AND 23. *Akodon xerampelinus*. Type.

species; tail, longer; pelage very long and fluffy with but little lustre; colors, paler — more yellowish, less reddish brown; under parts grayish (strong cin-

¹ Teeth much worn.

² *Xerampelinus*, of the color of dry vine leaves.

namon rufous in *A. teguina*); skull lighter and more delicate; rostrum lighter; nasals narrower; palatal slits rather wider; audital bullae slightly larger; molar-form teeth heavier — wider.

Color. — Upper parts uniform dark yellowish brown (a color that might, perhaps be called tawny burnt-umber) under parts, broccoli-brown; hands, feet, tail, and ears, blackish (slightly grayer, less intense black than these parts in *A. teguina apricus*; due to greater hairiness).

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,240 type	♂ old ad.	145	65	17	14
10,239	♂ ad.	140	65	17	13
10,241	♂ yg. ad.	127	56	18	13

Skull. ♂ old ad. type, basal length, 19.2; occipitonasal length, 22.6; zygomatic width, 11.6; mastoid width, 10.8; interorbital width, 4.2; length of nasals, 8.6; width of nasals, 2.6; length of palate, to palatal notch, 9.6; upper molar series, 4; length of single half of mandible, 13.

Remarks. — The little Akodon of the summit of Volcan de Chiriquí is very different from the one found at lower altitudes and is entitled to full specific rank. The three examples were taken on the desolate top of the Volcano, a little below actual timber line, but still where the forest had become stunted and sparse. Like *A. teguina apricus* they were found in open rocky country.

Macrogeomys cavator,¹ sp. nov.

Type. — Mus. Comp. Zool., No. 10,381, old ad. ♂, Boquete, Mar. 9, 1901.
4,800 feet.

Twenty-six specimens, both sexes, Boquete, 4,000 to 7,000 feet. February, March, and April.

Characters. — Differs from the four known Costa Rican species, though nearest *M. dolichocephalus* Merriam. Compared with the type of that species, the skull is shorter and wider across zygoma; nasals, longer; distance from postorbital process to back of zygomatic arch, shorter; audital bullæ, flatter; sagittal and lambdoidal crests, heavier; zygomatic arch heavier and more angulated, standing widely and squarely out from skull. Color, very dark and nearly uniform — not pied as in the other species. Pelage, short, close, and rather harsh.

Color. — Upper parts dark seal-brown — almost black; under parts similar but slightly grizzled, the pelage sparse, so that the skin shows through; a small white anal patch, and sometimes small white patches under chin and on under side of wrists; whiskers colorless; feet, hands, and tail, naked — in dried skin yellowish brown to dusky, the end of the tail black. In many

¹ *Cavator*, one who hollows out or excavates.

specimens there are longer hairs scattered through the pelage, some of which are silvery, others brown like the general color of the back.

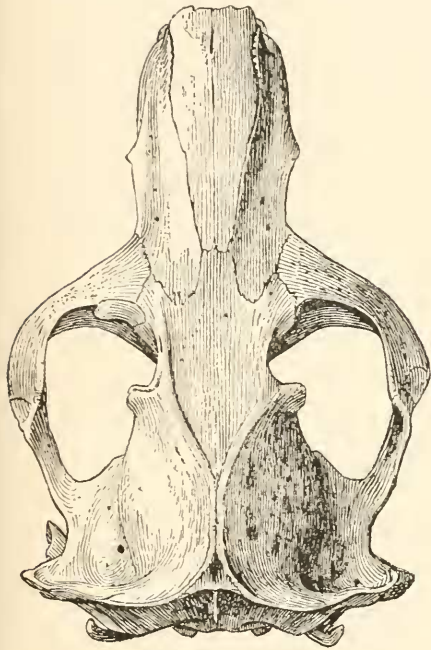
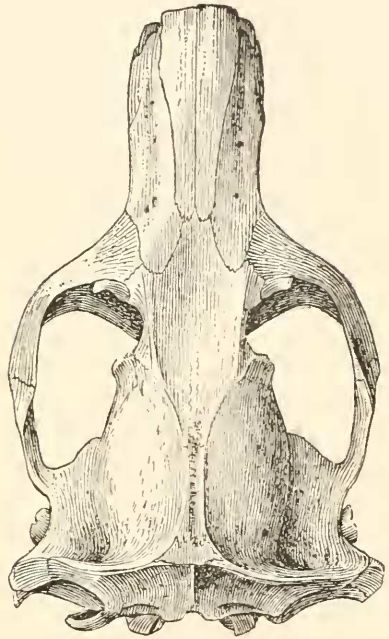
24. $\times 1\frac{1}{4}$.25. $\times 1\frac{1}{4}$.

FIG. 24. *Macrogeomys cavator*. Type, old ♂.

FIG. 25. *Macrogeomys cavator*. Topotype, old ♀. No. 10,389.

Measurements (twelve adults) —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,370	♂ old ad.	410	118	54	8
10,378	♂ old ad.	390	125	53	8
10,392	♂ old ad.	390	110	50	7
10,371	♂ old ad.	385	118	51	7
10,381 type	♂ old ad.	375	120	52	8
10,385	♂ yg. ad.	360	110	47	8
10,380	♀ old ad.	400	108	50	7
10,392	♀ old ad.	390	110	50	7
10,389	♀ old ad.	380	110	49	8
10,376	♀ old ad.	375	115	52	7
10,375	♀ yg. ad.	350	110	48	7
10,377	♀ yg. ad.	350	105	48	7

Skull, type, No. 10,381, ♂ old ad. (not quite so large as some of the very old specimens) basal length, 64; occipitonasal length, 67.8; zygomatic width, 45.8; mastoid width, 33.4; interorbital width, 11; length of nasals, 28; length of palate to palatal notch, 44.6; upper molar series, 15.4; length of single half of mandible, 51.2.

Old adult ♀, topotype, No. 10,389, basal length, 61.4; occipitonasal length, 63.4; zygomatic width, 40; mastoid width, 32; interorbital width, 10; length of nasals, 25.4; length of palate to palatal notch, 41.4; upper molar series, 15; length of single half of mandible, 48.

Remarks. — This very distinct new species, was abundant on the slopes of the volcano from 4,000 to 7,000 feet, but was not seen below 4,000 feet. It hardly needs comparison with any of the four previously known species from Costa Rica.

Macrogeomys pansa,¹ sp. nov.

Type. — Mus. Comp. Zool., No. 10,364, old ad. ♀, Bogaba, July 6, 1901.

Eight specimens, both sexes, Bogaba, July.

Characters. — Much smaller than the alpine, *M. cavator*; hind foot propor-

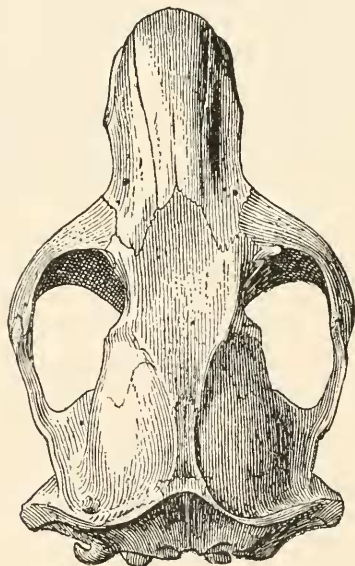


FIG. 26. *Macrogeomys pansa*. Type, old ♀. $\times 1\frac{1}{4}$.

tionally much larger (actually nearly the same size); colors duller and browner, more grayish white on belly; pelage short, close, very sparse on under parts,

¹ *Pansa*, broad-footed.

nose and sides of head and neck where the skin shows through. Skull much smaller and weaker throughout, with less spread to zygoma; nasals, shorter: interorbital width greater; molar-form teeth much smaller.

Color. — Upper parts dull, dusky, chocolate-brown; under parts grizzled, the belly whitish: whiskers mostly colorless; feet, hands, and tail naked (in dried skin) yellowish brown, the tip of the tail dusky.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,369	♂ adult.	325	110	48	7
10,368	♂ yg. ad.	320	105	50	6
10,362	♀ old ad.	330	110	52	5
10,364 type	♀ old ad.	320	110	48	6
10,366	♀ ad.	320	100	46	7
10,363	♀ ad.	330	100	47	6
10,365	♀ yg. ad.	320	110	47	6
10,367	♂ young	300	95	47	4

Skull, type. ♀ old adult, basal length, 54; occipitonasal length, 57.6; zygomatic width, 36; mastoid width, 27.8; interorbital width, 11.8; length of nasals, 23; length of palate, to palatal notch, 37; upper molar series, 13; length of single half of mandible, 41.

Remarks. — In July, when Mr. Brown was at Bogaba, birds were moulting and mostly unfit for specimens; consequently he spent considerable time searching for suitable places for future work, trapping mammals, and collecting a few examples of some of the rarer birds. On one of his long rides he came upon a single isolated colony of pocket gophers. It was in the foot-hills, about 600 feet altitude, and was the only colony he found in the whole region. The members of this colony were rather hard to trap, as pocket gophers sometimes are, and unfortunately the only old ♂ secured was caught in the trap by the head and the skull crushed. The species is very different from the large, black species found so abundantly on the higher slopes of the Volcan de Chiriqui.

Heteromys repens,¹ sp. nov.

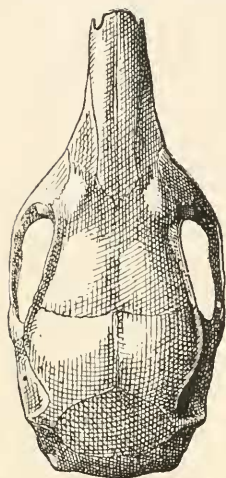
Type. — Mus. Comp. Zoöl., No. 10,356, old ad. ♀, Boquete, April 8, 1901. 4,000 feet.

Six specimens, Boquete, 4,000 to 5,800 feet, February and April.

Characters. — Apparently a very distinct species. Hind feet large, soles naked, six pads. These characters at once distinguish it from the Costa Rican *H. salvini nigrescens* Thomas. From *H. adspersus* Peters, from Panama, it differs in its longer hind feet and strong cranial characters, the skull being very much wider between the orbits; the nasals longer than the ascending branches of premaxilla (shorter in *H. adspersus*): the supraorbital beading

¹ *Repens*, unexpected, unlooked-for.

more overhanging, and not so S-shaped. From the large South American species (*H. anomalus* Thompson, *H. melanoleucus* Gray, and *H. jesupi* Allen) it can be separated by its shorter, wider skull, — much wider between orbits, and lighter rostrum.



× 1 $\frac{1}{4}$.

FIG. 27. *Heteromys repens*. Type.

H. longicaudatus Gray, from "Mexico," I do not know, and the description is wholly inadequate. Dr. Thomas says it belongs to this group. Possibly it may be somewhat like the present species, though if from Mexico this is improbable.

Color. — Upper parts, — top of nose and face to eyes grayish dusky; shoulders and sides finely mixed, dark, dusky, brown, and tawny ochraceous; median parts of rump and lower back darker, more dusky; no yellowish or fulvous line along lower sides; under parts, including upper lip, under side of nose, inner side of legs, and under side of arms, pure white; outer surface of legs dusky; upper surface of arms gray; feet and hands white; ears dusky, sparsely haired, with a slightly perceptible whitish border; tail thinly clothed with short, stiff hairs, dusky above, white below, and with a slight whitish pencil.

No. 10,360, young ♀, is in the slaty pelage of the very young, the whole upper parts being slaty. No. 10,361 ♀, also young, has in the middle of the back a large sized patch of hairs colored like those of the adult, the rest of the upper parts being slaty.

In No. 10,358 there are a good many wholly white spines scattered through the upper surface, and in the other three adults a very few of these white points can be seen.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,359 ¹	♂ old ad.	300	155	33	15
10,355 ¹	♂ old ad.	285	150	32	14
10,358 ¹	♂ old ad.	285	145	33	15
10,356 ¹ type	♀ old ad.	282	150	33	15
10,361	♀ young	247	130	32	15
10,360	♀ young	235	115	30	12

Skull, type, ♀ old adult, basal length, 31.4; occipitonasal length, 35.4; zygomatic width, 16.4; mastoid width, 14.8; interorbital width, 9.2; length of nasals, 14.8; width of nasals, 4.2; upper molar series, 4.8; length of single half of mandible, 17.2.

Remarks. — From Peters's careful description and plate it is perfectly clear that the Chiriqui *Heteromys* is distinct from *H. adspersus*. It is also clear

¹ All with worn teeth.

from Dr. Thomas's description that it is not his *H. salvini nigriscens*, but what Gray's *H. longicaudatus* may be I can only conjecture. The type is extant in the British Museum, but although Dr. Thomas has stated that it is a good species, he has never given any clue to its identity. Gray's original description is so meagre that it is unfortunate that Dr. Thomas did not characterize the species when he reinstated it.

Proechimys centralis chiriquinus THOMAS.

Thirty-one specimens, Divala, November and December, and Bogaba, July; those from the latter place are topotypes.

Though very common in the low lands and the foot-hills of the Volcan de Chiriqui, the spiny rat certainly does not ascend the Volcano to any great height, as Mr. Brown did not find it at Boquete.

Dasypsecta isthmica ALSTON.

Nine specimens, young and adults, Divala, November, Boquete, 3,500 feet, June, and Bogaba, July.

Agouti paca virgatus, subsp. nov.

Type, and only specimen. — Mus. Comp. Zoöl., No. 10,079, old ad. ♂, Divala, December 16, 1900.

Characters. — The Central American *paca* differs from the Brazilian form, true *A. paca* (Linn.), in being larger, with larger hind foot; in having the second stripe on the sides much less broken into spots; all the spots above the two lateral stripes smaller; the ground color of upper parts richer brown. Skull much larger; palate narrower; audital bullæ flatter.

Color. — Ground color of upper parts, walnut-brown; feet, hands, and cheeks duller, paler, and shaded with wood-brown; under parts white; on the lower sides a white stripe extending from hip to shoulder; above this another white stripe, a little shorter than the first; these two bands break up on sides of the neck and on flanks into series of white spots, which are much smaller on the flanks; above the white bands two rows of small white spots, the lower one reaching from sides of neck to flanks; the upper one very short — made up of only six or seven indistinct spots.

Measurements. — Type, old ad. ♂, total length, 740; tail vertebrae, 22; hind foot, 130; ear, 43. Skull, type, basal length, 139.6; occipitonasal length, 151; zygomatic width, 104; mastoid width, 54.8; interorbital width, 47.2; length of nasals, 51.2; width of nasals, 26; length of palate, to palatal notch, 76; width of palate at middle of second molar-form tooth, 7; at middle of last molar-form tooth, 10.2; upper molar series, 29.6; length of single half of mandible, 107.

Remarks.— I cannot find that the Central American paca has ever been named. The Museum has a large series of skulls of true *A. paca* from Brazil, and several specimens, skins and skulls, of the northern form from Costa Rica, collected by Gabb. One adult ♀ taken by Mr. Brown, at Santa Marta, Colombia, and Venezuelan examples in the United States National Museum, are apparently referable to true *A. paca*. I have not seen any specimens from Panama, but all examples from Costa Rica and Chiriqui belong to a race that is easily separable from true *A. paca* of Brazil.

The paca is said to be variable in color everywhere, light and dark individuals occurring together, but in spite of this I think the northern form averages much darker, richer brown. It certainly has the upper of the two lateral white stripes much less broken up into spots, and all the white spots much smaller. Besides these differences in color and pattern, the Central American animal is larger, with longer hind feet, and has a much larger skull, with narrower palate and flatter audital bullæ. Skulls of the paca vary a good deal individually in regard to the roughening of the upper surface. In some old skulls the upper surface is excessively roughened, while in others of about the same age it is comparatively smooth.

Lepus (Tapeti) gabbi (ALLEN).

Nine specimens, Divala, November and December. Boquete, 3,400 to 4,500 feet, March and April, and Bogaba, July.

The seasonal differences in color are well shown by this series. July specimens are much redder, with but few black-tipped hairs in the back, than autumnal examples.

Felis bangsi costaricensis MERRIAM.

One female, Boquete, 4,000 feet, April 22, the type of Dr. Merriam's new form.

Felis pardalis LINN.

One fine adult ♂, Boquete, 4,000 feet, April 10.

Conepatus¹ mapurito (GML.).

Two specimens, ♂ and ♀ adults, Boquete, 4,000 and 4,500 feet, February and March.

¹ I am aware of the proposed change in the generic names of the skunks, but, not having reached a definite decision, use the old name.

Galera barbara biologiae (THOMAS).

One male, Bogaba, July 9. The black-headed Central American form is a very strongly marked subspecies; in addition to this specimen the Museum has skins from Costa Rica collected by Gabb.

Putorius (Ictis) affinis (GRAY).

Three specimens, two adult and one young males, Boquete, 4,000 to 5,800 feet, February, March, and April. These examples agree very well with Gray's description; they vary somewhat among themselves in color; the young one, No. 10,114, has a wholly black head, the other two have small irregular (not the same on both sides) white patches, behind the eye, in front of the ear, and above the corner of the mouth. In No. 10,114, the under parts, except the chin, which is whitish in all three, are intense orange-rufous; in No. 10,112, the under parts are a paler shade of the same color; and in No. 10,113 paler still and more yellowish.

Measurements —

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear.
10,112	♂ old ad.	480	170	52	23
10,113 ¹	♂ ad.	400	143	43	20
10,114	♂ young	355	125	47	20

Potos caudivolvulus (SCHR.).

Three specimens, two males and a ♀, Bogaba, July. I do not think the Central American form is the same as true *P. caudivolvulus* of Surinam, but I have not sufficient material to decide the question.

Nasua narica (LINN.).

Six specimens, both sexes, Boquete, 3,800 to 5,800 feet, April and March. The nasuas separate naturally into many geographic races. These, as proper material accumulates, are gradually coming to be understood; the name *narica* is used here provisionally.

Procyon lotor hernandezii (WAGLER).

One male, Pedregal, July 25.

¹ I suspect this specimen was wrongly sexed, and is an adult ♀; judged by the skull it is not much younger than No. 10,112.

Myotis nigricans (WIED).

One ♀, Bogaba, July 1.

Eptesicus fuscus miradorensis (H. ALLEN).

One ♂, Boquete, 4,800 feet, March 23.

Lasiurus borealis mexicanus (SAUSSURE).

One ♂, Boquete, 4,000 feet, February 18.

Rhogeessa tumida H. ALLEN?

One ♂, Bogaba, July 6. Mr. Miller, to whom I submitted this specimen, is a little doubtful as to its identity with *R. tumida*, but on the strength of a single specimen preferred to so determine it.

Hemiderma brevicaudum (WIED).

Thirteen specimens, Bogaba, July. This series presents a wide range in the color of the upper parts, varying from hair-brown to russet, with every intermediate shade.

Glossophaga soricina (PALLAS).

One ♀, Bogaba, July 2.

Artibeus intermedius J. A. ALLEN.

Three specimens, an old ♀, and youngish ♂ and ♀, Bogaba, July. The younger specimens are more sooty, with the facial stripes less well indicated and have smaller skulls, and thus agree with the young described by Dr. Allen. I must confess, however, that I was at first inclined to regard these as belonging to a different species from the old one. The difference in size is great and the skulls do not show the degree of immaturity that one would expect with the difference in size.

Vampyrops helleri PETERS.

Six specimens, Bogaba, July.

Sturnira lilium (E. GEOFF.).

One adult ♀, Volcan de Chiriqui, 7,500 feet, February 17, 1901.

Desmodus rotundus (E. GEOFF.).

Three specimens, Bogaba, July.

Alouatta palliata (GRAY).

Three specimens, adult ♂ and ♀, and a youngish ♀, Boquete, 4,000 feet, April.

Saimiri oerstedii (REINH.).

Five specimens, both sexes, Bogaba, July.

The squirrel monkey is common in the scrubby forest of the foot-hills of the Volcan de Chiriqui. It was very tame, and Mr. Brown states that often little parties of them, would follow him about in the underbrush, chattering, and allowing him to come so near that he could almost put his hand on them. It is a beautiful creature, with a long tasselled tail, and is admirably shown in Alston's plate in the *Biologia Centrali-Americana*. Mr. Brown states that he never saw a creature that he disliked so to kill, and after he had secured five specimens, nothing would induce him to molest the little troupes that accompanied him on his rambles over the foot-hills.

Cebus hypoleucus (HUMBOLDT).

Two adult females, Boquete, 4,000 feet, March, and Bogaba, July.